

## ABSTRACT

An apparatus and method for optically, parametrically amplifying a small-signal. A small-signal optical parametric amplifier (OPA) includes a narrowband pump source, means for suppressing stimulated Brillouin scattering (SBS) (*e.g.*, a phase modulator),  
5 coupled to the narrowband pump source, a booster amplifier, coupled to the SBS-suppressed pump output, a bandpass filter, coupled to the booster amplifier, a low-loss coupler, coupled to the bandpass filter and the receiving end of a small-signal transmission line, and means for performing non-linear mixing, coupled to the injection  
10 coupler. The narrowband pump source produces a pump output. The booster amplifier amplifies the SBS-suppressed pump output to a sufficient power level for achieving parametric gain. The bandpass filter bandpass filters the amplified, SBS-suppressed pump output and suppresses amplified spontaneous emission (ASE) in the pump output. The low-loss coupler couples the filtered, amplified, SBS-suppressed pump output with a  
15 small-signal received from the small-signal transmission line. The non-linear mixing means parametrically amplifies the small-signal with the filtered, amplified, SBS-suppressed pump output to produce an amplified output signal.